"I find two errors in the MS. of my solution of (373). In the printed solution on page 56, second line, strike-out the words, "and positive downwards", and, in fourth line from bottom, for "$dx \div ds = -y \div r$", read $2\rho dx = ds^2$. From these two corrections there follow two resulting corrections, viz.; in lines 8 and 9, change the signs of the second member in the right-hand equation in each; and in line 3 from bot., for $-1 \div 2a$ read $-1 \div 2\rho$.

"*Errors in printing.* Strike-out g in line 10 and insert $+ g$ in the 2nd parentheses in line 11; and in line 16 insert $+ g$ immediately before the first bracket".

SOLUTIONS OF PROBLEMS IN NUMBER TWO.

SOLUTIONS of problems in No. 2 have been received as follows:

From Prof. L. G. Barbour, 387, 390; Prof. W. P. Casey, 387, 388, 389, 391; Prof. A. B. Evans, 387; George Eastwood, 390; W. E. Heal, 387, 388, 389; Prof. A. Hall, 391; Prof. J. Scheffer, 387; Isaac H. Turrell, 390.

Prof. Casey should have been credited, in No. 2, for a solution of 383.

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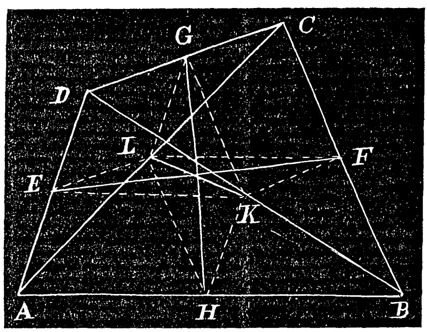
387. *By Prof. L. G. Barbour.*—"Given the length of each side of any quadrilateral, and the distance from the middle point of any side to that of the side opposite. Required the distance from the middle point of one of the other sides to that of the side opposite."

SOLUTION BY W. E. HEAL.



Let EF, GH be the lines joining the middle points of opposite sides of the quadrilateral $ABCD$, and LK the line joining the middle points of the diagonals.

Put $AB = 2a$, $BC = 2b$, $CD = 2c$, $DA = 2d$, $EF = k$, $GH = h$.

Then $FL = EK = a$, $GH = HL = b$, $EL = FK = c$, $GL = HK = d$.

And, since $GHLK$ and $EFLK$ are parallelograms,

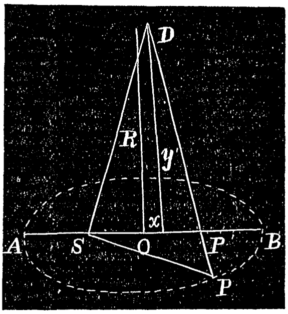
$$h^2 + (LK)^2 = 2(a^2 + c^2),$$

$$k^2 + (LK)^2 = 2(b^2 + d^2).$$

$$\therefore h^2 - k^2 = 2(a^2 - b^2 + c^2 - d^2).$$

388. *By Prof M. L. Comstock.*—"F and F' being the foci of an ellipse and P a point on the curve, FD is drawn perpendic'r to FP meeting $F'P$ in D. Find the locus of D: (1) when $b > c$, (2) when $b = c$, (3) when $b < c$, if $b =$ semi-minor axis and $c =$ distance from the centre to either focus."

SOLUTION BY PROF. W. P. CASEY.



Let x, y be the coordinates of D to the axes AB, OR, O being the center of the ellipse. Then $FS = c+x$ and $SF' = c-x$, $FP = a+ex$ and $F'P = a-ex$; and $F'D = [(c-x)^2+y^2]^{1/2}$. $\therefore PD = [(c-x)^2+y^2]^{1/2}+a-ex$ and $FD^2 = (c+x)^2+y^2$. $\{ [(c-x)^2+y^2]^{1/2}+a-ex \}^2-(a+ex)^2$, or $(c-x)^2+y^2+2(a-ex)[(c-x)^2+y^2]^{1/2}+(a-ex)^2-(a+ex)^2 =(c+x)^2+y^2$. Therfore $2(a-ex)[(c-x)^2+y^2]^{1/2}= 4cx+4aex = 8cx$, or $[a-(c\div a)x]^2[(c-x)^2+y^2] = 16c^2x^2$, the equation of the curve which is the locus of the point D; and taking $b > c$, $= c$ and $< c$, we find each curve.

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389. *By Prof. W. W. Johnson.*—"If three triangles have a common axis of homology when taken in pairs, the three centres of homology are in a straight line: and reciprocally if three triangles have a common centre of homology when taken in pairs, the three axes of homology pass through a common point."

SOLUTION BY W. E. HEAL.

It is only necessary to prove the first part of the theorem, from which the second part follows by reciprocation.

Let ABC, $A'B'C'$, $A''B''C''$ be the given triangles whose corresponding sides meet in three points O, O', O'' lying on the common axis of homol'y.

The lines AA', BB', CC' meet in O the center of homology of the triangles ABC, $A'B'C'$; $A'B''$, $B'B''$, $C'C''$ meet in O', the center of homology of $A'B'C'$, $A''B''C''$; and $A''A$, $B''B$, $C''C$ meet in O'' the center of homology of $A''B''C''$, ABC.

The triangles $AA'A''$, $BB'B''$, $CC'C''$, taken in pairs, have either O, O', O'', for a center of homology, and therefore the intersections of corresponding sides are in a straight line; but these are the points O, O', O'', the centers of homology of ABC, $A'B'C'$, $A''B''C''$.

390. This is the same as 356, and its solution will be found at page 163 of Vol. VIII. It was inserted in No. 2 by an oversight.

391. "Given

$$\log. 91 = 1.95904 \pm r,$$
$$\log. 92 = 1.96379 \pm r,$$

find log. 91.5 to five decimals, by simple proportion from the difference; and find the probable error of this logarithm."

ANSWER BY PROF. ASAPH HALL.

If f be the interpolating factor we have $f\varDelta = 237.5$, and the value of log 91.5 is 1.96142, or 1.95141.

To find the probable error of this value, let r_1, r_2, be the errors of the two logs, and r_3 the error made in stopping the product $f\varDelta$ at the given decimal; then the real error of the interpolated value is

$$(1-f)\cdot r_1 + f\cdot r_2 + r_3.$$

Assuming f constant, the probable error is found from the mean value of some power of the real error; — r_1, r_2, r_3 being independent variables between the limits ± 0.5. The following are the results given by Bremiker, the editor of our best logarithmic tables: Since $r = 0.25$,

$f =$	0.0	: 0.1	: 0.2	: 0.3	: 0.4	: 0.5	: 0.6	etc.
Pr. Er. =	0.293	: 0.279	: 0.270	: 0.263	: 0.262	: 0.261	: 0.262,	etc.

The method that I gave in the preceding No. of the ANALYST is incorrect. In fact, the law of error is not that which is assumed in the method of least squares.

QUERY BY PROF. H. T. EDDY.—"When two determinants of the same order have the same algebraic value, show whether it is always possible to transform the one into the other by mere combinations of rows and colu'ns; and if possible transform the two following values of $2bc\cos A—b^2—c^2$, the one into the other:

$$\begin{vmatrix} 0, & b, & c, \\ b, & 1, & \cos A, \\ c, & \cos A, & 1, \end{vmatrix}, \qquad \begin{vmatrix} 2bc\cos A, & b, & c, \\ b, & 1, & 0, \\ c, & 0, & 1, \end{vmatrix}."$$

Prof. Casey answers the above query as follows:

"The two determinants are equal; but by no combination of rows or columns can $2bc\cos A$ be factored so as to transform this determinant into the other. Neither can the first be transformed into the second, as far as I can see, by any of the known laws of determinants."